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Norwegian spring-spawning herring. A bio-economic analysis of future resource management

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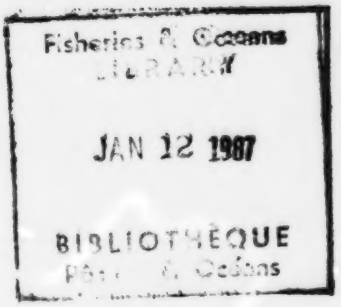

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REPORT: Norwegian Spring-spawning Herring. A bio-economic analysis of future resource management.

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EXTRACT:

The report assesses the consequences of different utilization strategies for Norwegian spring-spawning herring from a socio-economic and biological point of view. The results show that it is most profitable to build up stocks to a biologically safe level relatively quickly, by keeping the take small in the years ahead. How large the most profitable catches are, is determined by market conditions. How long the catches should be restricted, on the other hand, is determined by biological conditions, especially recruitment and natural mortality.

TABLE OF CONTENTS

Section	Page
1. Introduction	1
2. Stock model for spring-spawning herring	2
2.1. Stock structure	2
2.2. Biology	3
2.3. Fishery	
2.4. Size of stock and utilization	5
2.5. Catch and stock	7
2.6. Stock and recruitment	8
2.7. Growth and sexual maturing	13
2.8. Fishing pattern and available stock	16
2.8.1. Availability	16
2.8.2. Catch pattern	16
3. Economic exchange	19
3.1. Revenue	19
3.2. Costs	23
3.2.1. Fishing costs	24
3.2.2. Cost of processing	25
3.2.3. Market costs	27
3.3. Distribution keys for revenue and costs	29
4. Results	30
4.1. Tridimensional presentation of the results	30
4.2. Base solutions	34
4.2.1. Fixed quotas	35
4.2.2. Variable quotas	47
4.2.3. Strong generations each Nth year	53

5. Sensitivity analysis of base solutions 56

5.1. Discounting rate 56

5.2. Quantity assigned to special products 62

5.2. Market price for special products 65

6. Conclusions 67

7. List of literature 71

1. INTRODUCTION

At the end of the sixties, the stock of spring-spawning herring was just about fished out. This caused a cessation of important seasonal fisheries such as large and spring herring fishery in Vestlandet, fat-herring and whitebait in Northern Norway, and the so-called "Iceland fishery" in the Norwegian Sea (North Atlantic between Norway and Greenland). It was the development in the technology of catching fish which was the primary cause of overfishing in the traditional herring fishery. The new and improved technology for catching fish resulted in new resources of herring and mackerel being accessible to Norwegian fishermen in the North Sea, and when the take from these was at its highest, the North Sea fishery to a certain extent compensated for the loss of income from the Norwegian spring-spawning herring. Subsequently, the stocks in the North Sea have also been overfished, and now a particularly great need has arisen for a vigorous herring stock, which can give new life to an old industry.

A small part of the 1969 class survived as whitebait. In the seventies, fishing for Norwegian spring-spawning herring has been strictly regulated to save this age group and its progeny, and as a result of this restrictive regulations policy, a significant recruitment to the stock has been demonstrated. This has created an increasing demand for greater freedom to catch herring, which in turn has brought to the fore the question as to whether, given the present stock situation, it is economically defensible to fish herring, and if so, how much.

What we will present here, is the result of a cross-disciplined research project, carried through by researchers at the

Havforskningsinstituttet and Fiskeriteknologisk Forsknings-institutt (FTFI) (Institute of Ocean Research and Institute of Fishery Technology Research) (1) with the aim of throwing light on these questions, on the basis of the knowledge we have of biology, catches and turnover of Norwegian spring-spawning herring.

The work consists of calculating the total socio-economic results of the herring fishery. The socio-economic result is obtained by calculating the difference between the community's income and expenses. These calculations are carried out with the help of a model, which simulates the development of stock as a function of utilization and where recruitment, growth and natural mortality are included as parameters. Yield in weight plus the balance of the stock are then converted into monetary units, with consideration being given to relevant market conditions. This is the income side in the model. The expenditure side includes the community's costs incurred by catching, processing and marketing of herring and herring products.

The model is built on information from the herring fishery, involving biological, economic and fisheries-technical data. The biological part simulates nature's basis for fishery and will be described first. The second part deals with the economic conditions and describes the distinctive quality and relationship between the factors that together determine the socio-economic result. The third part deals with the socio-economic result of some actual utilization strategies, and the consequences the different strategies can have for the development of the stock. Lastly, a sensitivity analysis is carried out, related to those parameters

in the model that have the greatest significance for the results.

2. STOCK MODEL FOR NORWEGIAN SPRING-SPAWNING HERRING.

2.1. Structure of the stock.

Norwegian spring-spawning herring includes, pursuant to the present regulation resolutions, all herring that spawns on the Norwegian coast north of 62°N. This herring consists of several spring-spawning strains, of which the Atlantic-Skandinavian strain is the largest. The term Norwegian spring-spawning herring is often used synonomously with herring of the Atlantic-Skandinavian strain.

(1) Johannes Hamre, Havforskningsinstituttet, Lars Nestaas, FTFI. (Finished work in the summer of 1982) and Sigfus Kristmannsson FTFI.